

CLAIMS

What is Claimed is:

1. A minimum signature solid propellant formulation comprising:
  - about 6.0 to about 9.0 weight % of at least one polymeric binder;
  - 5 about 21 to about 25 weight % of at least one energetic plasticizer;
  - about 25 to about 45 weight % of ammonium dinitramide prills having a  
particle size of about 100  $\mu\text{m}$  to about 200  $\mu\text{m}$  as an ADN prills  
oxidizer; and
  - about 15 to about 25 weight % of CL-20.
- 10 2. The solid propellant formulation of Claim 1, wherein said CL-20 has a particle  
size of about 3  $\mu\text{m}$ .
3. The solid propellant formulation of Claim 1, wherein said binder is selected from  
the group consisting of polycaprolactone, poly(diethyleneglycol-4,8-dinitraza  
undeconate) and polyglycidal nitrate.
- 15 4. The solid propellant formulation of Claim 1, wherein said plasticizer is selected  
from the group consisting of butanetriol trinitrate, trimethylolethane trinitrate, n-  
n-butyl-N-(2-nitroxyethyl)nitramine and any combination thereof.
5. The solid propellant formulation of Claims 1, further comprising at least one  
member selected from a curative, a stabilizer, a cure catalyst, crosslinker, a burn  
20 rate modifier and a bonding agent.
6. The solid propellant formulation of Claim 5, wherein said curative is selected  
from the group consisting of hexamethylene diisocyanate, m-tetramethylxylene  
diisocyanate, dimeryl diisocyanate, toluene diisocyanate, polymeric

hexamethylene diisocyanate, isophorone diisocyanate, biuret triisocyanate and any combination thereof.

7. The solid propellant formulation of Claim 5, wherein said cure catalyst is selected from the group consisting of triphenyl bismuth triphenyltin chloride, dibutyltin diacetate and dibutyltin dilaurate.

8. The solid propellant formulation of Claim 5, wherein said stabilizer is selected from the group consisting of N-methyl-p-nitroaniline and 2-NDPA (2-nitrodiphenylamine).

9. The solid propellant formulation of Claim 5, wherein said burn rate modifier is carbon black.

10. The solid propellant formulation of Claim 5, wherein said crosslinker is nitrocellulose.

11. A minimum signature solid propellant formulation comprising:

about 6.0 to about 9.2 weight % of at least one polymeric binder;

about 21 to about 28 weight % of at least one energetic plasticizer;

about 35 to about 45 weight % of ammonium dinitramide prills having a

particle size of about 100  $\mu\text{m}$  to about 200  $\mu\text{m}$  as an ADN prills

oxidizer; and

about 15 to about 25 weight % of CL-20.

12. The solid propellant formulation of Claim 11, wherein said polymeric binder is polycaprolactone.

13. The solid propellant formulation of Claim 11, wherein said energetic plasticizer comprises:

about 4.0 to about 6.0 weight % of butanetriol trinitrate;  
about 7.0 to about 9.0 weight % of trimethylolethane trinitrate; and  
about 10.0 to about 13.0 weight % of n-n-butyl-N-(2-nitoxyethyl)nitramine.

5    14.    The solid propellant formulation of Claim 11, further comprising at least one member selected from a curative, a stabilizer, a cure catalyst, crosslinker, a burn rate modifier and a bonding agent.

15.    A minimum signature solid propellant formulation comprising:

about 6.0 to about 9.0 weight % of at least one polymeric binder;  
10    about 20 to about 34 weight % of at least one energetic plasticizer;  
about 25 to about 45 weight % of ammonium dinitramide prills having a particle size of about 100  $\mu\text{m}$  to about 200  $\mu\text{m}$  as an ADN prills oxidizer; and  
about 15 to about 25 weight % of CL-20.

15    16.    The solid propellant formulation of Claim 15, wherein said polymeric binder is poly(diethyleneglycol-4,8-dinitraza undeconate).

17.    The solid propellant formulation of Claim 15, wherein said energetic plasticizer comprises:

about 5.0 to about 12.0 weight % of butanetriol trinitrate; and  
20    about 15.0 to about 22.0 weight % of trimethylolethane trinitrate.

18.    The solid propellant formulation of Claim 15, further comprising at least one member selected from a curative, a stabilizer, a cure catalyst, crosslinker, a burn rate modifier and a bonding agent.

19. A minimum signature solid propellant formulation comprising:

about 6.0 to about 10.5 weight % of at least one polymeric binder;

about 12 to about 32 weight % of at least one energetic plasticizer;

about 25 to about 45 weight % of ammonium dinitramide prills having a

5 particle size of about 100  $\mu\text{m}$  to about 200  $\mu\text{m}$  as an ADN prills

oxidizer; and

about 15 to about 25 weight % of CL-20.

20. The solid propellant formulation of Claim 19, wherein said polymeric binder is polyglycidal nitrate.

10 21. The solid propellant formulation of Claim 19, wherein said energetic plasticizer comprises:

about 0 to about 7.0 weight % of said butanetriol trinitrate;

about 10.0 to about 15.0 weight % of said trimethylolethane trinitrate; and

about 2.0 to about 10.0 weight % of said n-n-butyl-N-(2-

15 nitoxyethyl)nitramine.

22. The solid propellant formulation of Claim 19, further comprising at least one member selected from a curative, a stabilizer, a cure catalyst, a burn rate catalyst and a bonding agent.

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